

MONTHLY WEATHER REVIEW,

NOVEMBER, 1880.

(General Weather Service of the United States.)

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE.

INTRODUCTION.

In preparing this REVIEW the following data, received up to December 14th, have been used, viz: the regular tri-daily weather charts, containing the data of simultaneous observations taken at 144 Signal Service stations and 15 Canadian stations, as telegraphed to this office; 166 monthly journals and 157 monthly means from the former, and 15 monthly means from the latter; reports from 3 Sunset stations; 226 monthly registers from Voluntary Observers; 32 monthly registers from United States Army Post Surgeons; Marine Records; International Simultaneous Observations; monthly reports from Voluntary Observers in, and the local Weather Service of, Missouri; reliable newspaper extracts; special reports.

BAROMETRIC PRESSURE.

Upon chart No. II is shown, by the isobaric lines, (in black) the distribution of atmospheric pressure over the United States for November, 1880. On the Pacific Slope an area of unusually high pressure prevailed over Oregon and Washington Territory, the mean being above 30.30 at all Oregon stations. An area of very high pressure covered the Middle States and the Ohio valley and Tennessee, the mean ranging in these districts from 30.22 to 30.29. Except at the Rocky Mountain stations, in the Plateau districts, the South Atlantic and Eastern Gulf States, the mean pressures have been decidedly greater than have ever before been recorded by this Service in November.

Departures from Normal Values for the Month.—By comparison with the average for seven years it is found that the barometric pressure for November, 1880, except in the Plateau and Rocky Mountain districts (where the departures from the normal have been slight and unimportant,) has been very decidedly above the average. The excess in New England, the Middle States, the Lower Lake region and the Ohio valley has ranged from 0.16 inch to 0.20; elsewhere, except along the immediate Gulf coast, it varied from 0.10 to 0.19. On the Pacific coast the excess was 0.08 at San Diego, 0.12 at San Francisco and 0.20 at Portland.

The Local Barometric Ranges, from readings reduced to sea-level, have, during November, 1880, been greater than usual. These ranges, eastward of the 102nd meridian, as a rule, increase from the coast toward the interior so that lines of equal ranges are generally parallel to the sea coast. In the Gulf States the lines deviate slightly from this rule and trend from the northeast to the southwest—the fluctuations in Texas being decidedly greater than in Florida. The local ranges for the month decrease gradually along the Gulf coast from 0.92 at Indianola to 0.36 at Punta Rassa and Key West. Along the Atlantic coast they increase gradually from 0.51 at Jacksonville to 1.23 at Portland, Me. The greatest fluctuations occurred over the Lake region and the Ohio valley; greatest ranges, 1.44 inches at Marquette, 1.45 at Columbus, 1.48 at Madison and Rochester and 1.50 at Buffalo. In the elevated plateaux of the country the range increases quite regularly with the latitude, while on the Pacific Slope the lines of equal ranges trend from northwest to southeast, indicating that the range increases with latitude and elevation. The greatest ranges on that coast were 1.19 at Olympia and 1.42 at Umatilla.

General Barometric Range.—The extreme range of the atmospheric pressure, reduced to sea-level, was 1.75 inch, from 30.86 at Cincinnati on the morning of the 22nd, to 29.11 at Father Point on the afternoon of the 7th.

Areas of High Pressure.—Nine such areas have prevailed during November, 1880, two of these areas were encroachments of the area of high pressure from the North Pacific ocean. No. VI appears to have been formed by an encroachment of high pressure from the Pacific ocean together with an outflow from Saskatchewan. No. III appeared first in Texas, although it may have moved eastward from the Plateau districts. Nos. III, VII and VIII were especially noted for the unusually high pressures and very low temperatures for the season. In consequence the pressure has been abnormally high and the temperature proportionally low.

No. I.—This area, described as No. IX in the October REVIEW, moved from the Gulf States northeastward and, reinforced by rising pressure in Canada, covered the North Atlantic States and the Canadian Maritime Provinces until the morning of the 5th, when it gradually dissipated. The highest pressure reported was on the morning of the 5th, at Sydney, Nova Scotia, 30.64 or 0.73 above the normal. During the prevalence of this area cloudy and rainy weather, with brisk easterly winds, continued in the South and Middle Atlantic States. During its eastward movement Cautionary Signals were displayed on Lake Erie on the 1st, which were followed by westerly winds, with hourly velocities ranging from 26 to 29 miles on that lake. During the 3rd and 4th, Cautionary Signals were displayed from Smithville northward to Portland. These signals were lowered during the 5th, having been generally justified. The following maximum velocities were reported: Wood's Holl, SE. 26 miles; Barneгат and Sandy Hook, SE. 36; Cape Hatteras, SE. 39; Kittyhawk, SE. 46; Cape Lookout, E. 50.

No. II.—The pressure gradually increased on the Pacific coast during the 3rd; Olympia barometer at midnight 0.38 above the normal. On the morning of the 4th the highest pressure of the area was at Ft. Keogh, 0.46 above the normal; during the day the area gradually dissipated.

No. III.—During the 6th the pressure in the Gulf States rose slightly above the mean; Eagle Pass barometer that afternoon 0.21 above the normal. The area withdrawing slowly eastward covered the Atlantic Slope during the 8th and 9th and united on the 10th with area No. V. At midnight of the 5th Cautionary Signals on the Texas coast were changed to Off-shore and were lowered on the 6th; Indianola, NW. 36; Galveston, N. 32.

No. IV.—During the 7th the pressure increased along the North Pacific coast. On the afternoon of the 8th the Olympia barometer was 0.31 above the normal. The area rapidly dissipated. Occasional rain fell during the 7th in Oregon and Washington Territory.

No. V.—During the 9th the pressure rose above the normal in the Northwest; Fort Garry barometer at midnight 0.37 above the normal. Moving slowly eastward it apparently united on the 16th with high area No. III in the St. Lawrence valley where, on that afternoon, the highest reading of the area was reported from Quebec, 0.47 above the normal. Subsequently it dissipated or withdrew eastward in advance of low area No. V. In connection with this area and low area No. III signals were displayed on Lake Michigan and the eastern half of Lake Superior from the afternoon of the 6th to the afternoon of the 7th. These signals were partly justified by a west wind of 28 miles at Grand Haven. Cautionary Signals were displayed during the 9th and the morning of the 10th along the North Carolina coast, and were lowered the morning of the 11th. These signals were justified by the following hourly velocities: Norfolk, SE. 26 miles; Cape Lookout, SE. 33; Cape Henry, SW. 36, and Cape Hatteras, S. 40. Near Smithville a schooner was driven ashore by the gale.

No. VI.—During the 9th the pressure rose rapidly along the North Pacific coast where by the afternoon of the 11th the barometer at Olympia stood 30.63 or 0.60 above the normal. The pressure continued nearly stationary in Washington Territory at 0.50 above the normal until the 17th when it gradually dissipated. During this time the highest pressure in California did not exceed 0.30 above the normal until the 14th, when the barometer was 0.41 above at Sacramento and 0.33 above at Yuma. On the same date the highest pressure of the area was reported from Umatilla, 0.72 above the normal. On the 11th a portion of this area covered the Missouri valley. During the 12th the area extending farther eastward by midnight had raised the pressure above the normal over the entire country, except the Canadian Maritime Provinces. On the morning of the 13th the highest pressure east of the Rocky Mountains was at Ft. Garry, 0.63 above the normal. During the 14th the eastern half of this area gave way before low area No. VII, but again covered the Ohio valley during the 16th as that area moved eastward. By the morning of the 17th the main area had moved eastward of the Rocky Mountains and was central at midnight in Indian Territory; Ft. Gibson barometer 0.60 above the normal. Moving gradually eastward the southern portion of the area dissipated in the Gulf States during the 18th, while the northern half withdrew eastward to the Canadian Maritime Provinces, where it dissipated on the 20th. On the morning of the 13th Cautionary Signals were ordered for the North Carolina coast, and fully justified, were continued during the 14th in connection with low area No. VI. Signals were displayed on the Texas coast from the 12th to the 14th, part of the time as Cautionary and part as Off-shore. Northerly winds, ranging from 29 to 34 miles, were subsequently reported. As this area moved eastward and low area No. VII passed, Cautionary Signals were ordered somewhat late on the 18th from Ft. Macon to Sandy Hook, and Cautionary Off-shore from New Haven to Portsmouth N. H. They were all lowered on the 19th, fully justified. The following velocities were reported: Boston, NW. 30; Shoreham, Wood's Holl and Thatcher's Island,

NW., 40; Kittyhawk and Cape Henry, NE., 40; Cape May, NW., 45. The passage of this area was marked by minimum temperatures of the month in Florida, the Gulf States, the greater part of the Plateau districts and the Southern Rocky Mountain Slope. These temperatures as is shown elsewhere were in the Gulf States lower than ever before recorded in November. In connection with the approach of this area predictions of frosts were made for the sugar growing districts. These forecasts were unfortunately verified and it is estimated that one-tenth of the sugar crop was lost thereby, although much cane was saved by "wind rowing" it after the warnings were given. Ice formed throughout the greater part of the sugar-growing district in Louisiana during the 18th and 19th. The passage of this area was nearly identical with that of November 26th to 30th, 1877, which, differing but slightly from the present month, furnished a record of the lowest known November temperatures, (except at isolated stations) for the Southern States.

No. VII.—This area, the most important of the month, was apparently an outflow of dry cold air from Saskatchewan or Manitoba. During the 20th the pressure rose rapidly in the Missouri valley and at midnight was central in Missouri; Omaha and Leavenworth barometers 0.39 above the normal. Moving slowly eastward the pressure was increased by an additional outflow of cold air from Hudson's Bay Territory, so that while the centre remained nearly stationary in the Ohio valley during the 22nd and 23rd the pressure at Cincinnati rose to 30.85 or 0.67 above the normal, the highest pressure ever noted at that station. As this area withdrew eastward from the Ohio valley to the Middle States during the 23rd, advancing high area No. VIII united with it. Its subsequent history is considered as that of No. VIII. Cautionary Signals were ordered for the North Carolina coast and having been justified were continued until the 26th in connection with high area No. VIII. The passage of this area was marked by minimum temperatures for the Lake region, the Atlantic States, the Ohio, Upper Mississippi and Lower Missouri valleys. Except in New England, these temperatures were remarkably low for November. They occurred from seven to eight days earlier in the month than the remarkably low temperatures of 1875. The most notable temperatures observed at Signal Service Stations were Washington, 12°; Philadelphia, 10°; St. Louis and Louisville, 8°; Pittsburgh, 4°; Buffalo, 3°; Chicago, 1°; Erie, Detroit, Sandusky, Grand Haven and Des Moines, 0°; Champaign, —3°; Alpena, —4°; Columbus, Indianapolis, Keokuk and Milwaukee, —5°; Port Huron, —6°; Marquette, —9°.

No. VIII.—This area, advancing from Manitoba during the 23rd, but for intervening low area No. XIII, might have been considered as a part of high area No. VII. On the 24th the highest pressure was over Minnesota, (St. Paul barometer at midnight 0.54 above the normal) while that of high area No. VII was over New England. As the low area above-mentioned moved northeastward this area gradually followed and merged with high area No. VII. Withdrawing slowly eastward over the Canadian Maritime Provinces it dissipated during the 27th and 28th in advance of low area No. XV. The western portion of this area extended to the Pacific coast, where the pressure remained considerably above the normal until midnight of the 27th. Cautionary Signals displayed for high area No. VII on the New England coast were continued during the 25th and at midnight additional signals were ordered somewhat late from Cape May to Chincoteague. These signals were all lowered by the morning of the 27th. The following wind velocities were reported: Delaware Breakwater, N. 32; Cape Lookout, N. 43; Kittyhawk, N. 50.

No. IX.—During the 28th the pressure rose rapidly in the Northwest and by the morning of the 29th an area of high pressure, central in the Lower Missouri valley, extended southward from Manitoba to Texas. The highest pressure of the area was reported from Cincinnati at midnight of the 29th, being 0.36 above the normal. Withdrawing northeastward it covered the Canadian Maritime Provinces at midnight of the 30th.

Areas of Low Pressure.—Sixteen areas are described for November, 1880. Eleven of these areas have followed tracks sufficiently well defined to permit the charting of them. Of these areas, Nos. III, VI and XI, were possibly of cyclonic origin. Four originated in the Rocky Mountain districts, one developed in Minnesota, and the remaining areas probably formed in Saskatchewan or Hudson's Bay Territory. No area, except possibly No. V, originated on the Pacific coast. Nos. III, V, VII and X, were storms of marked and unusual violence in the Lake region, and caused the loss of many lives and destruction of many vessels. The severity of the storms in the early part of the month on Lake Ontario, may be inferred from the statement that during the first twelve days of the month the crew of the Oswego life-saving station rescued forty-five persons, thirty-nine of whom were saved from wrecks. No. XI proved to be an unusually severe storm along the New England coast, the Canadian maritime Provinces and Newfoundland. The extreme violence of these storms has in a large measure been occasioned by the rapidity with which the low areas have been followed by areas of high pressure.

No. I.—This disturbance, probably developing in Manitoba, extended southeastward during the 1st, and covered on the morning of the 2d the Lower Missouri valley. On the morning of the 3d a trough of low pressure extended southward from Manitoba to southern Texas, with no well-defined centre. The lowest pressure of this area was reported on that afternoon from Yankton, 0.37 below the normal. It merged during the 4th into low area No. II.

No. II.—During the 2d and 3d the pressure was considerably below the mean from the Mississippi valley westward to the Rocky Mountain slope. This disturbance, central the afternoon of the 3d in southwestern Texas, moved northeastward and united with low area No. I during the 4th in Missouri; lowest pressure that afternoon, at St. Louis, 0.32 below the normal. By the morning of the 5th its centre had passed northeastward over Lake Michigan into Canada. Cautionary signals were ordered for Lake Michigan the afternoon of the 3d, and for the rest of the Lake region during the 4th. The signals on Lakes Superior and Michigan were lowered at midnight of the 5th, but remained displayed at the remaining Lake stations in connection with advancing low area No. III, with which they are treated. The following maximum wind velocities were reported in connection with this area: Milwaukee, W. 25; Duluth, NW. 32; Erie, S. 32. Cautionary signals were ordered for the Texas coast on the morning of the 3d and, justified, were changed during the 5th to Off-shore.

No. III.—This storm, which was one of marked and unusual violence in the Lower Lake region, was possibly of cyclonic origin. At midnight of the 5th a sharp barometric fall was reported from the central coast of the Gulf States; New Orleans and Mobile barometers 0.22 below the normal. On the morning of the 6th a trough of decreased pressure extended from Alabama northward to Ohio; Knoxville, Nashville and Columbus barometers 0.34 below the normal. During the day the pressure rapidly decreased, being that afternoon 0.60 below the normal at Columbus, and at midnight 0.86 below at Kingston. Moving rapidly northeastward it was central in the Lower St. Lawrence valley on the morning of the 7th, and later in the day passed over the Gulf of St. Lawrence. At midnight of the 5th signals displayed for area No. II were continued on the Lower Lakes, and all stations were warned of this advancing storm. This storm, in connection with advancing high area No. III, was unusually severe in the Lower Lake region and New England. The storm on Lake Erie was said to have been the worst for 30 years. Rain or snow, with northerly backing to westerly gales prevailed, with wind-velocities as follows: Sandusky W. 43; Erie NW. 44; Toledo W. 44. At Toledo many vessels warned remained in port; all venturing out were obliged to put in for shelter; and one was lost. Two schooners and three barges were driven ashore, and others were severely damaged. On Lake Ontario the storm was even more severe. During the 7th the wind attained velocities of W. 36 at Oswego; W. 44 at Rochester and W. 60 at Buffalo. On that morning the propeller *Zelanda* foundered; crew, 16 in number, all lost. One schooner and crew of seven, were lost, and one passenger steamer and one schooner missing, probably lost. Four other steamers, one barge and one scow, were driven ashore and several vessels badly damaged. Many vessels remaining in the harbor at Buffalo escaped the storm; all others leaving port were driven back badly damaged. At Buffalo the storm was very violent, doing considerable damage to property; the mean hourly velocity of the wind for the twelve hours preceding 12 m. of the 7th, was 43 miles. Part of Main street was submerged by high water. At Utica the storm was very violent, unroofing a church and damaging other property. A violent thunder-storm occurred at Poughkeepsie at 2 p. m. of the 7th. During the morning violent gales occurred at Toronto and the greater part of the province of Ontario. Much damage was done to houses and other buildings at Canandaigua, Palmyra and other portions of western New York. During the 6th Cautionary Signals were displayed along the Atlantic coast from North Carolina to Maine, and were changed later from Cautionary to Off-shore, from Cape Hatteras to Portland; they were lowered at the afternoon and midnight reports of the 7th; these signals were fully justified by southeasterly veering to northwesterly gales, with the following maximum velocities: Portland SE. 31 and NW. 34; Boston W. 32; Eastport S. 36; Shoreham SW. 36; Cape Hatteras NW. 36; Kittyhawk SW. 44; Wood's Holl NW. 42 and SW. 45; Cape May W. 62. Very severe weather was reported from Long Island Sound and off the New England coast. At Thatcher's Island the Signal-Office building was unroofed by the gale. Strong westerly gales prevailed in the Canadian Maritime Provinces during the 8th; Father Point wind in the afternoon and midnight W. 55 miles. During the 7th and 8th, strong westerly gales and high seas were reported by incoming European steamers.

No. IV.—This area appeared in the extreme Northwest on the morning of the 6th; Bismarck barometer, on that afternoon, 0.35 below the normal. By midnight the area had filled up or merged into low area No. III.

No. V.—During the 6th the pressure fell rapidly on the North Pacific Coast and on the morning of the 7th the barometer at Olympia was 0.17 below the normal. The centre, considerably to the northward of the Signal Service stations, by a southeasterly course, reached northern Dakota on the morning of the 8th; Bismarck barometer 0.52 below the normal. At that time, an extensive trough of low pressure covered the country from the Plateau districts eastward to the Mississippi valley. During the day, the pressure rose in the Missouri valley, and the centre of this area moved due south to northern Texas, where it was central the afternoon of the 9th. Changing its course to north-northeast, it was central with decreasing pressure, the morning of the 10th in Iowa; (Keokuk barometer 0.63 below the normal,) and on the morning of the 11th in northern Michigan; Marquette barometer 0.66 below normal. Changing its course to the eastward through Canada, considerably to the north of the Signal Service stations, it reached the Gulf of St. Lawrence the afternoon of the 12th. Cautionary Signals were ordered for the Texas coast during the 8th, and were changed, as the area moved eastward, to Off-shore. Maximum velocities of SW. 40 and NW. 40, were reported from Indianola. Cautionary Signals were displayed at Pensacola on the 9th, justified by a wind of

SW. 25 miles. Considerable damage was done to vessels in Pensacola harbor. As this area moved northeastward from Texas at midnight of the 9th, Cautionary Signals were displayed on Lake Michigan, and were ordered the following morning for the rest of the Lake region and along the Atlantic coast from Chincoteague to Wood's Holl. These signals were charged to Off-shore on the New Jersey coast, the morning of the 11th, and along the New England coast, the morning of the 12th. They were lowered during the 12th, as follows: On Lakes Superior and Michigan, in the morning, Lakes Huron and Erie, Long Island Sound and the New Jersey coast in the afternoon, and at the remaining stations at midnight. These signals were all fully justified; the greatest wind velocities reported were, as follows: Duluth, NW., 32; Alpena, NE., 33; Cleveland and Erie, SW., 34; Buffalo, W., 37; Milwaukee, SW., 34; Thatcher's Island, SE., 33, and W., 33; Shoreham, SE., 34, and W., 32; Eastport, SE., 34; Wood's Holl, W., 44, and NW. 44. This gale was very severe in the Lake region, along the New England coast, and in the Gulf of St. Lawrence. The wind velocities at Father Point on the 13th, were, as follows: a. m., W. 50; p. m., W., 44; m., NW., 40. On Lakes Erie and Ontario, in addition to the foundering of the schooners *Norway* and *Morning Star*, by which 15 lives were lost, many vessels were seriously damaged and a number driven ashore.

No. VI.—At midnight of the 13th, decreasing pressure was reported from the South Atlantic States, where, on the morning of the 14th, Jacksonville barometer was 0.03 below the normal. This area probably moved northward, not far from the South Atlantic coast. Sudden squalls, damaging the bark *O. C. Clary* in 32° 25' N., 72° 30' W., on the 14th, were reported. Vessels arriving at Smithville, reported a hurricane at sea on the 15th. At midnight, the barometer at Cape Hatteras was 0.23 below the normal, while high northerly winds, accompanied by heavy rain, prevailed along the South Atlantic coast. During the 15th, the area probably moved northeastward towards Nova Scotia. During the 14th, Cautionary Signals displayed along the North Carolina coast for high area No. VI were continued and Cautionary Signals were ordered from Norfolk to Sandy Hook. These signals were lowered in the afternoon of the 15th, having been justified by the following maximum velocities: Cape May, N., 26; Cape Henry, N., 28; Smithville, SE., 36; Kittyhawk, NE. 44.

No. VII.—moved southeastward from Manitoba and on the morning of the 15th was central in Minnesota; Duluth barometer 0.48 below the normal. The centre continued in a southeast course and passing over Lake Michigan, was central, with increased pressure in southern Michigan the morning of the 16th, whence it passed northeastward into Canada during that day. Cautionary Signals were ordered for the Upper Lake region at midnight of the 14th and for the stations on the other Lakes, except Ontario the following day. They were lowered on the Upper Lakes during the 15th and at the Lower Lake stations on the following morning. These signals were justified by rough weather and high winds, the schooner *E. M. Carrington* being lost, with a crew of five on Lake Michigan, and three vessels foundered or totally wrecked (crews saved,) on Lake Erie. The following are some of the maximum velocities which were reported: Buffalo, SW. 25; Toledo, SW. 27; Marquette, W. 27; Duluth, NW. 30; Grand Haven, NW. 32; Port Huron, W. 33.

No. VIII.—During the 15th the barometer fell very rapidly in California and the Southern Plateau districts, and by the morning of the 16th an extensive area of low pressure covered these districts and southwestern Texas. The lowest pressures connected with this area, occurred as follows: Ft. Yuma, 0.22 below the normal; Prescott, 0.24 and Santa Fe, 0.25 below, the afternoon of the 16th, at which time the lowest pressure also occurred at Silver City and La Mesilla. Its course eastward being apparently prevented by high area No. VI, it withdrew westward to California; San Francisco barometer at midnight 0.23 and Visalia 0.24 below the normal. During the prevalence of this area clear weather was reported from California, Nevada and Arizona. On the Colorado desert, near Mammoth Tank, violent sand storms occurred during the 16th, suspending all railway travel for 16 hours.

No. IX.—This area suddenly appeared in the St. Lawrence valley on the morning of the 18th, and moving through Maine, by midnight had passed eastward, with decreasing pressure beyond the Cape Breton coast, where the lowest pressure was then reported, 0.38 below the normal at Sydney.

No. X.—During the 18th the pressure gradually decreased over the Plateau regions, and by midnight this area was central in Nebraska; Cheyenne barometer, 0.23 below the normal. Moving northeastward the centre on the morning of the 20th, was over the eastern end of Lake Superior, whence it passed eastward, with increasing violence through Canada and reached the St. Lawrence valley at midnight. On the morning of the 21st, it united over the Gulf of St. Lawrence, with low area No. XI. On the morning of the 20th, Cautionary Signals were ordered for Lakes Michigan, Huron and Erie and that afternoon for Lake Ontario. These signals were lowered on the 21st in the Upper Lake region and on the following morning at the Lower Lake Stations. This storm was unusually severe over Lake Ontario, where four vessels were wrecked and ten more badly damaged. At Buffalo one vessel was sunk and one person drowned. The following maximum velocities were reported: Marquette, W. 26; Milwaukee, W. 36; Alpena and Port Huron, W. 34; Erie, SW. 42; Oswego, W. 33; Buffalo, W. 37.

No. XI.—During the night of the 19th and 20th, the pressure decreased rapidly along the South

Atlantic coast. On the morning of the 20th the barometric fall extending northward, became more sudden and marked; New London barometer 0.34 below the normal (a fall of 0.39 in eight hours) Cape Hatteras barometer 0.31 below the normal (a decrease of 0.20 in eight hours.) The lowest pressure connected with area No. X was then 0.30 below the normal at Parry Sound. At midnight this area was central over the Bay of Fundy, with the following decrease of pressure reported for the past eight hours: Sydney, 0.38 inch; Father Point, 0.39; Chatham, 0.50; Halifax, 0.59; Eastport, 0.61 and Yarmouth, 0.71. On the morning of the 21st the area united with No. X over the Gulf of St. Lawrence: Sydney barometer 29.29 or 0.61 below the normal (a fall of 0.71 in eight hours and 1.09 in sixteen hours.) Cautionary Signals were displayed during the 20th for New England and the North Carolina coast, and were lowered, in the latter district, at midnight. Cautionary Off-shore Signals were also ordered for the New Jersey coast. In New England, except for Eastport, these signals were later changed to off-shore. These signals were lowered on the New Jersey coast on the morning of the 21st, but were continued at the remaining stations until the morning of the 22nd. This storm was one of unusual violence off the New England coast, the Canadian Maritime Provinces and off the Banks of Newfoundland, continuing in the latter district until the 25th. A dispatch from St. John's, N. F., reports that over thirty vessels were lost; fourteen in Bona Vista harbor, six in Conception Bay, several in Green Bay. The following are some of the wind velocities reported: Portland, W. 31; Shoreham, NW. 42; Boston, W. 44; Wood's Holl, NW. 44; Thatcher's Island NW. 40; Yarmouth, N. 55; Father Point, 21st, a. m., W. 48, p. m., W. 84, m., W. 65; 22nd, a. m., W. 54, p. m., W. 60, m., W. 48.

No. XII.—During the 22nd and 23rd, the pressure fell gradually over Nevada; on the morning of the 24th, Pioche barometer 0.31 below the normal. Apparently withdrawing southeastward into New Mexico, the area gradually filled up during the 25th. As a portion of this area extended into Texas, Cautionary Signals were ordered for that coast on the 24th, but were not justified.

No. XIII.—formed between high areas Nos. VII and VIII. Central at midnight of the 23rd over Lake Superior it moved nearly due east, and passing through Maine, was central over the Gulf of St. Lawrence on the afternoon of the 25th. A marked feature of this area consists in the fact that the lowest pressures during its passage were 0.19 *above* the normal at Marquette on the morning of the 24th, and 0.13 *above* at Halifax the afternoon of the 25th. Cautionary Signals were displayed on Lakes Michigan, Huron and Erie during the 24th, but were justified only on Lake Huron; Alpena, S. 25; on that lake the storm was very severe, and the Steamer *Sincoe* foundered, twelve men lost.

No. XIV.—During the 26th the pressure decreased slowly over the Plateau region; Pioche barometer, the morning of the 27th, 0.33 below the normal. Extending slowly eastward with slightly increased pressure, the area, on the morning of the 28th, in the shape of a trough, covered New Mexico, western Texas and northern Arizona, with the lowest pressure at Fort Stockton, 0.25 below the normal. Subsequently the area gradually filled up.

No. XV.—This area apparently developing in Manitoba where it was central at midnight of the 27th, following an easterly path passed down the valley of the St. Lawrence during the 29th. While passing eastward its centre skirted the northern limits but at no time entered the confines of the United States. Signals were displayed, somewhat late, at Grand Haven.

No. XVI.—This area probably developing in Saskatchewan, was in northern Montana on the morning of the 30th. It moved slowly eastward and was central, at midnight, in northeastern Dakota; St. Vincent and Fort Stevenson barometers 0.69 below the normal.

INTERNATIONAL METEOROLOGY.

Three International charts, Nos. IV, V and VI, accompany the present Review. They are for the months of *October*, 1880 and *March*, 1879.

Chart No. IV.—This is a *preliminary* chart, and indicates, as well as is at present (Dec. 10, 1880,) possible, the tracks of some of the principal storms over the North Atlantic Ocean and adjacent land areas during the month of *October*, 1880. The meteorological conditions over the North Atlantic Ocean during this month were characterized by very severe storms, all those indicated on the chart having been accompanied by hurricane winds. The general position of the tracks is much more to the south than usual, and noteworthy peculiarities are found in the small number traversing the region of Newfoundland, (reports from St. John's and Heart's Content not yet to hand,) and in the narrow limits within which an unusually large number of storms arrived on the western coast of Europe, not less than five severe storms arriving at the entrance of the English Channel during the month, namely, on the 5th, 7th, 20th, 22d and 27th. In conformity with this distribution of the storm-centres, the weather over the British Isles was marked by cold northeasterly winds and heavy rains, the latter resulting in disastrous floods and the former reducing the average temperature several degrees below the normal value. Thus, for the week ending October 25th, the temperature deficit in the several districts, (see *Weekly Weather Report*, issued by the Meteorological Office, London,) ranged from 8° to 11° Fahr. For the same reason easterly winds prevailed, almost without intermission, over the ocean north of the 45th parallel throughout the entire month. As yet no storm-centre for this month